HERS Rating & Green Certification – New Code, How Now??

Sam Greene

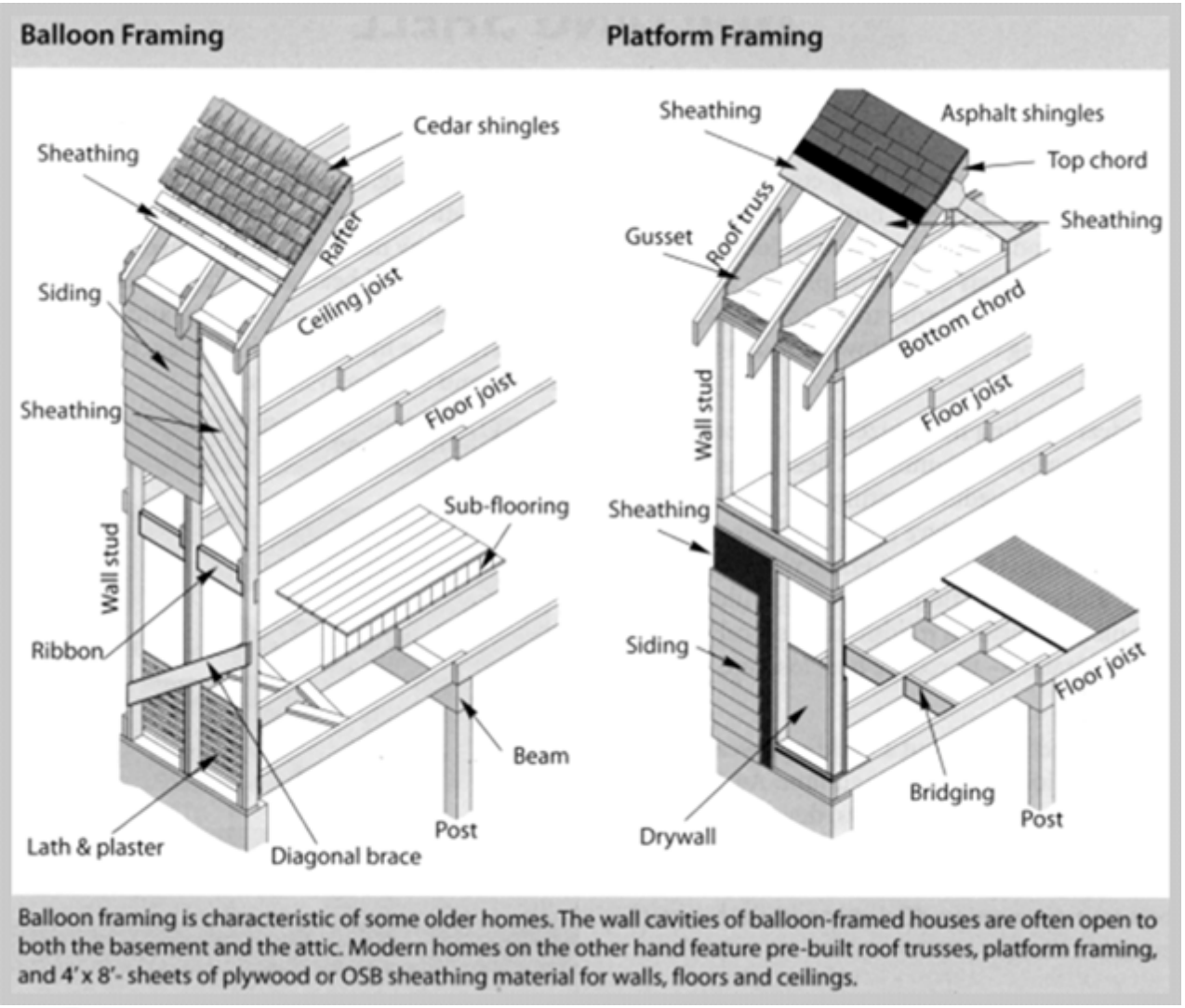
Residential Science Resources

"A Rising Tide Raises All Ships."

residential science resources

HOUSE RATER

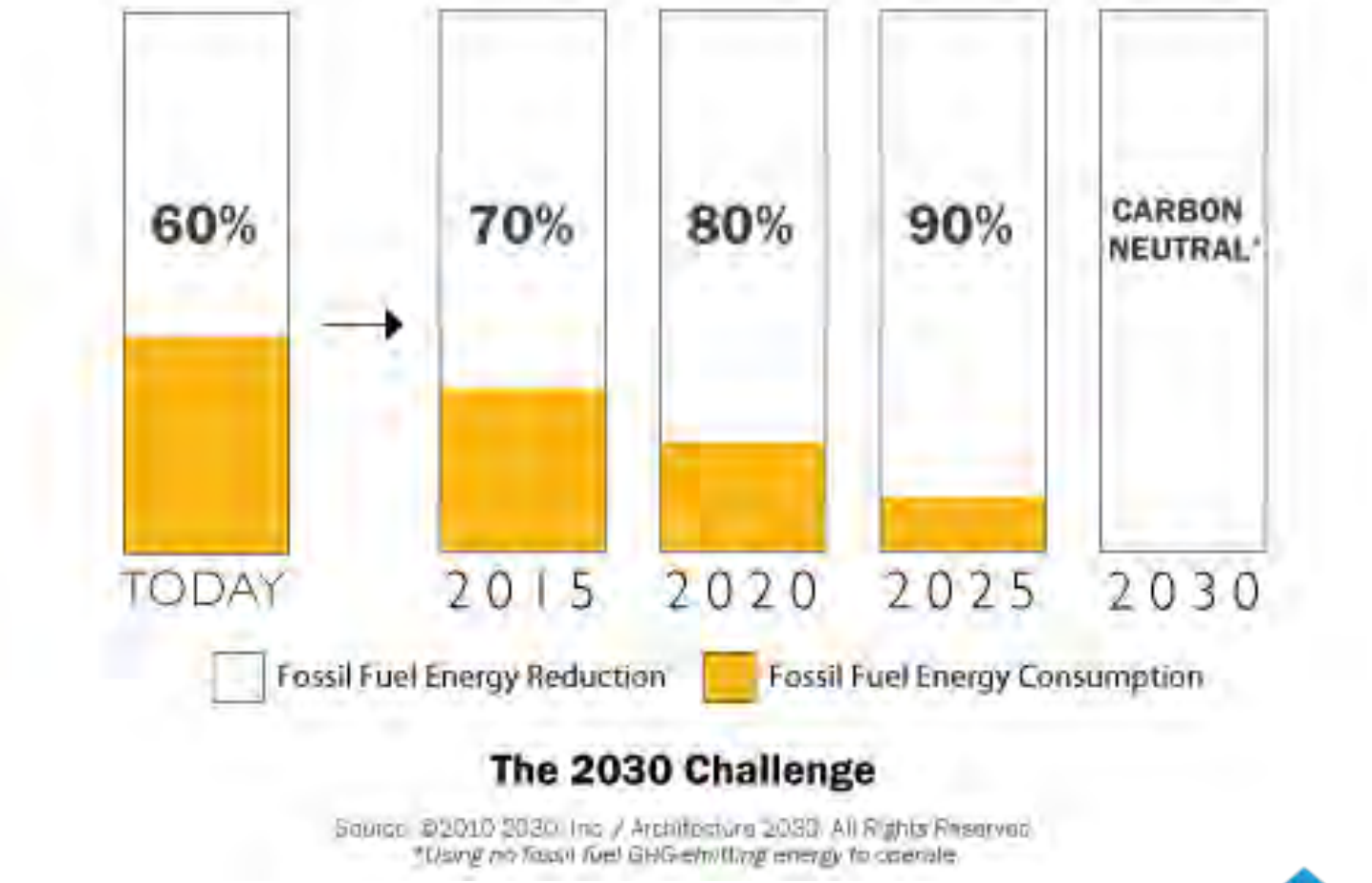
How Far have we Come?



Balloon framing is characteristic of some older homes. The wall cavities of balloon-framed houses are often open to both the basement and the attic. Modern homes on the other hand feature pre-built roof trusses, platform framing, and 4' x 8'- sheets of plywood or OSB sheathing material for walls, floors and ceilings.

Wood = R1 per inch. 2x6 stud = R6

Look forward at the 2030 federal energy Goals.

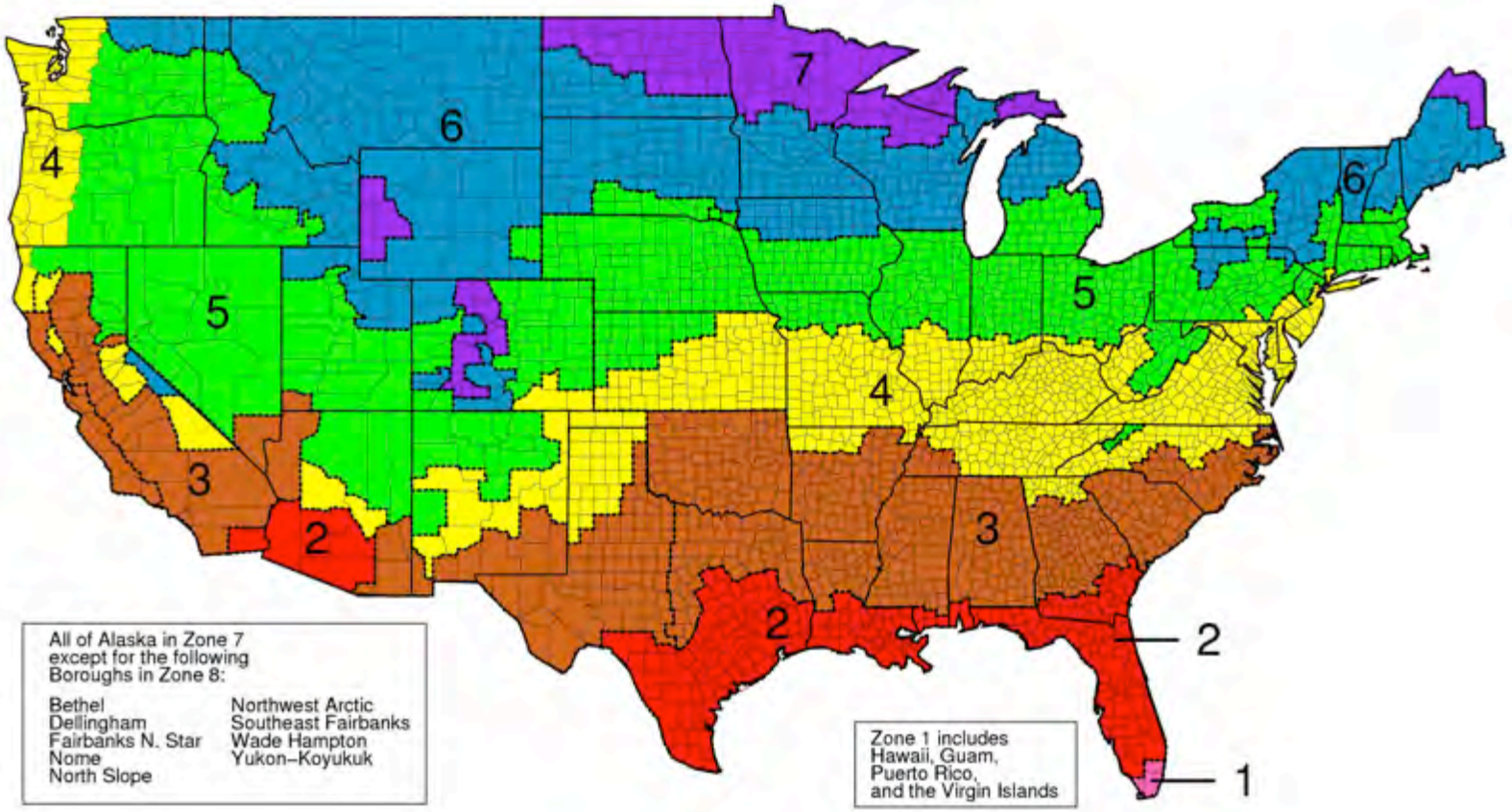


Residential Science Resources

ENERGY 2030

HOUSE RATER

Climate zone overview



residential science resources

HOUSE RATER

The 2012 IECC – Coming in 90 mins

Table 1: Changes in insulation and U-factors for prescriptive (Table R402.1.1) path in the 2012 IECC

Climate Zone	Fenest. U-Factor	Skylight U-Factor	Glazed Fenest. SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-Value	Floor R-Value	Basement Wall R-Value	Slab R-Value & Depth	Crawl Wall R-Value
1	~~1.20~~ 0.50[a]	0.75	~~0.3~~ 0.25	30	13	3/4	13	0	0	0
2	~~0.65~~ 0.40	~~0.75~~ 0.65	~~0.3~~ 0.25	~~30~~ 38	13	4/6	13	0	0	0
3	~~0.50~~ 0.35	~~0.65~~ 0.55	~~0.3~~ 0.25	~~30~~ 38	~~13~~ 20 or 13+5	~~5/8~~ 8/13	19	5/13	0	5/13
4 except Marine	0.35	~~0.60~~ 0.55	~~NR~~ 0.40	~~38~~ 49	~~13~~ 20 or 13+5	~~5/10~~ 8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	~~0.35~~ 0.32	~~0.60~~ 0.55	NR	~~38~~ 49	20 or 13+5	13/17	30	~~10/13~~ 15/19	10, 2 ft	~~10/13~~ 15/19
6	~~0.35~~ 0.32	~~0.60~~ 0.55	NR	49	~~20 or 13+5~~ 20+5 or 13+10	15/~~19~~ 20	30	15/19	10, 4 ft	~~10/13~~ 15/19
7 and 8	~~0.35~~ 0.32	~~0.60~~ 0.55	NR	49	~~21~~ 20+5 or 13+10	19/21	38	15/19	10, 4 ft	~~10/13~~ 15/19

(a) In the prescriptive approach, any fenestration is credited with meeting this requirement.

Residential Science Resources

HOUSE RATER

The 2012 IECC

New Mandatory requirements

House must test out at 3 ACH 50 or better
(Lower is better)

residential Science resources

HOUSE RATER

The 2012 IECC

New Mandatory requirements

Total Duct leakage testing will be required to be 4 CFM per 100 sq.' of conditioned floor area.

Exception: If all ductwork and air handler is within Thermal Envelope.

Residential Science Resources

HOUSE RATER

We've Already had Duct Leakage Testing Done Before…

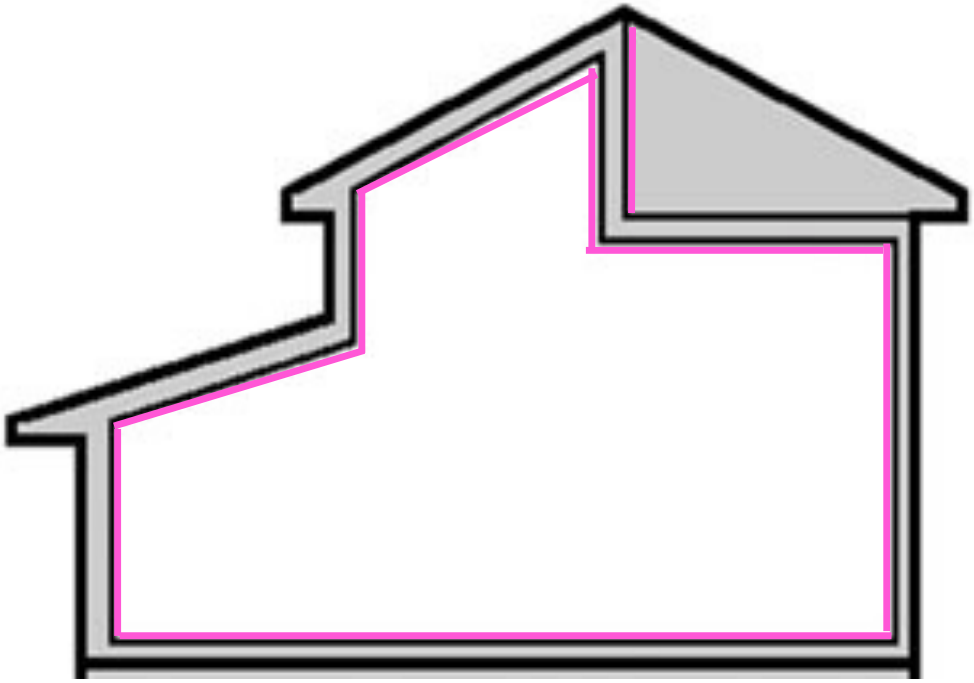
Not Like This – You Haven't Yet!

residential science resources

HOUSE RATER

“Conditioned Space” Defined

- Pressure Boundary
- Thermal Boundary
- Where 70 deg air stops.



residential Science resources

HOUSE RATER

Let me Tell you a Recent Energy Star Story…

residential science resources

HOUSE RATER

Ductwork Tightness Solutions

residential science resources

HOUSE RATER

Ductwork Tightness Solutions

residential science resources

HOUSE RATER

Ductwork Tightness Solutions

Not Allowed Anymore

residential Science resources

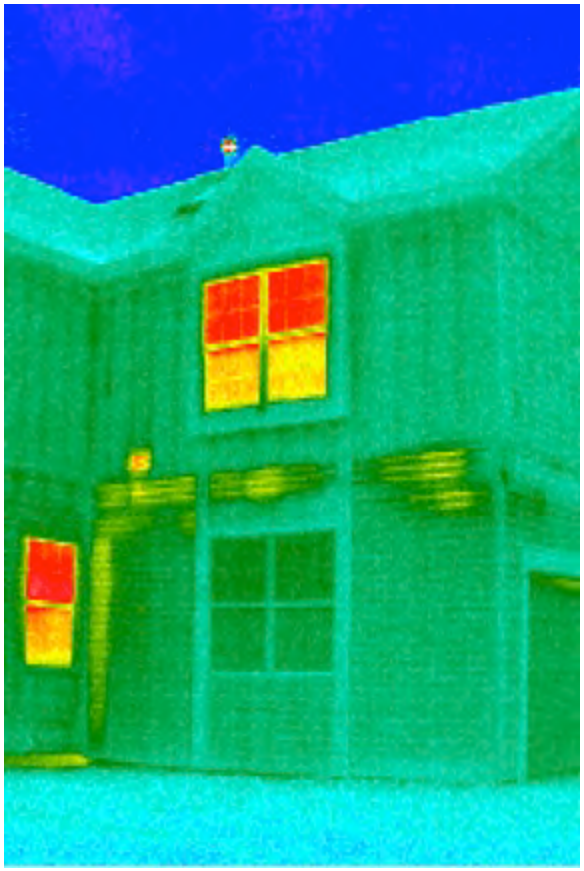
HOUSE RATER

Ductwork Tightness Solutions

Residential Science Resources

HOUSE RATER

Ductwork in Outside Wall Cavities? NO



residential Science resources

HOUSE RATER

Problems with Ductwork

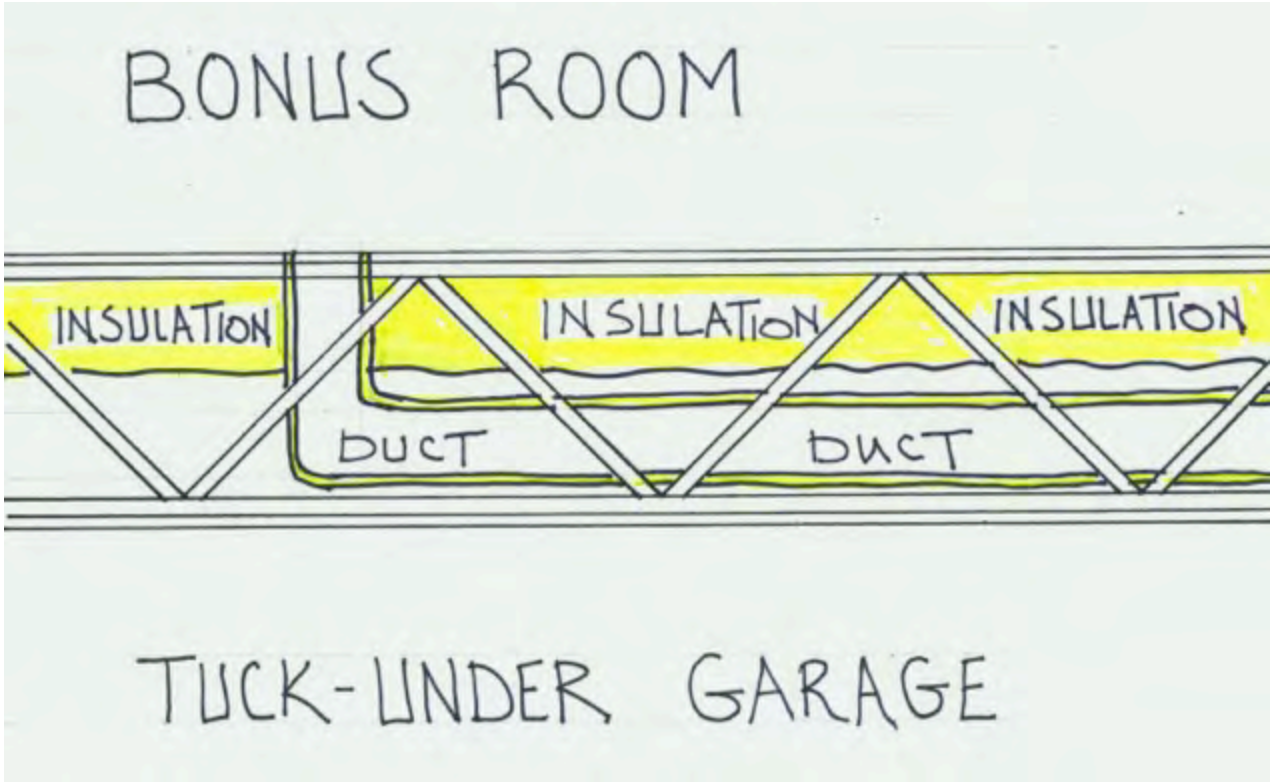
Residential Science Resources

HOUSE RATER

Problems with Ductwork

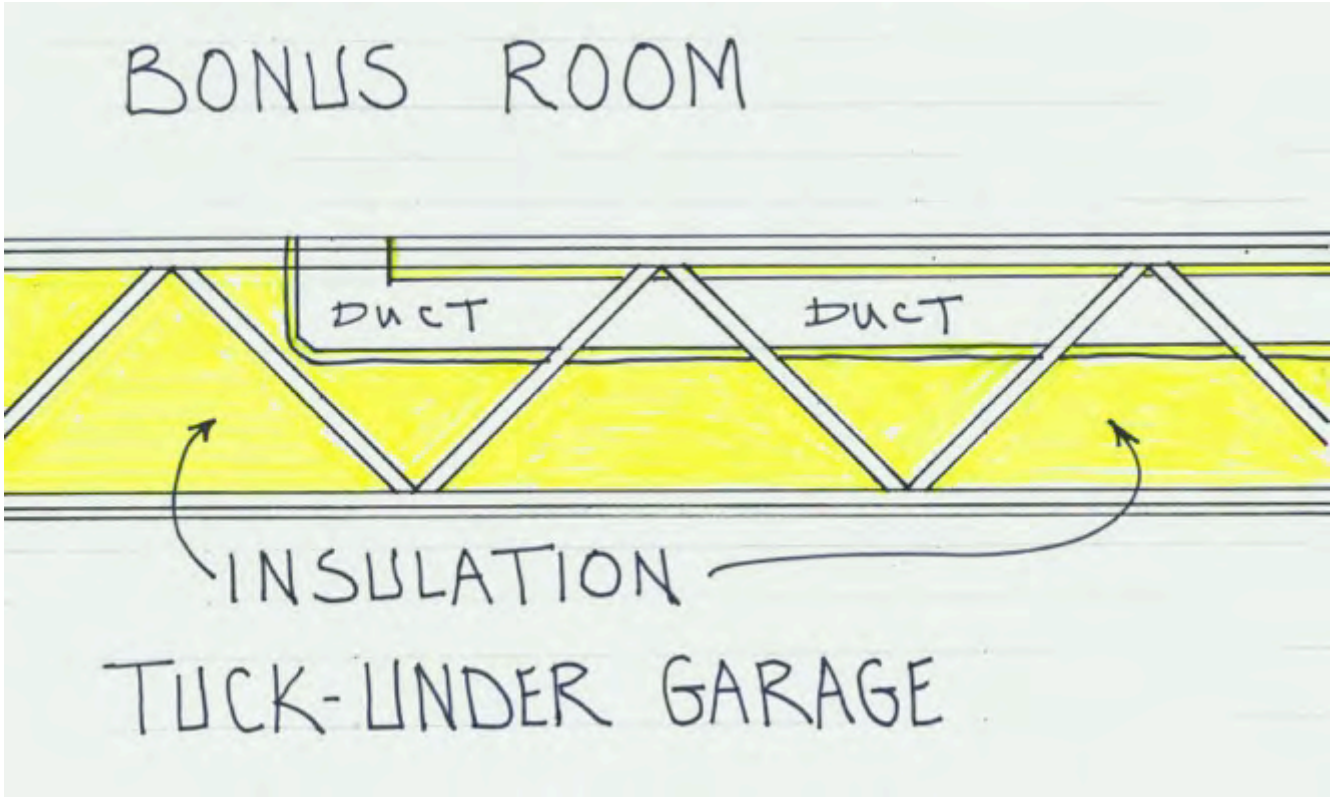
Common practice Now

(insulated duct below insulation)



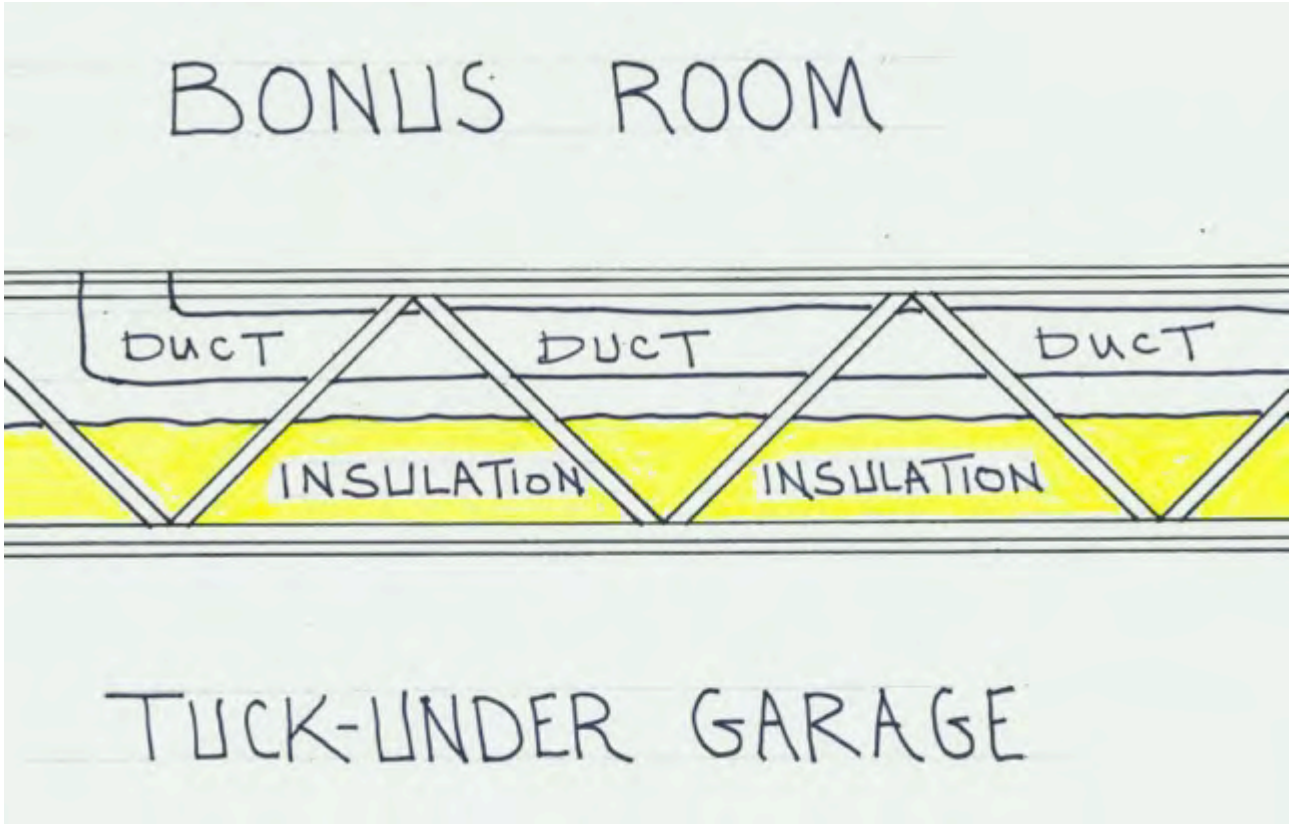
One Solution…

(insulated ducts & full insulation in floor)



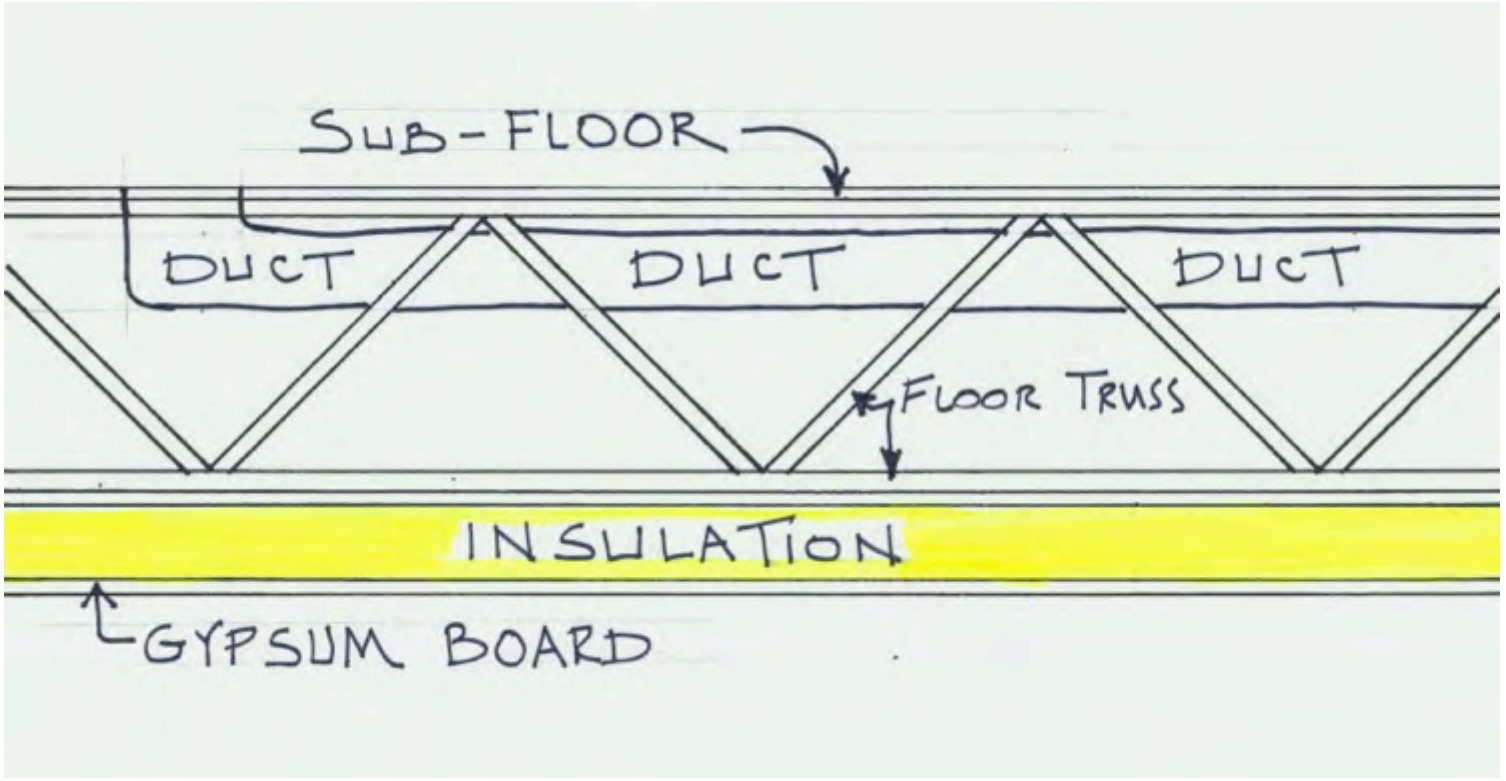
Becomes This…

(uninsulated ducts above insulation)



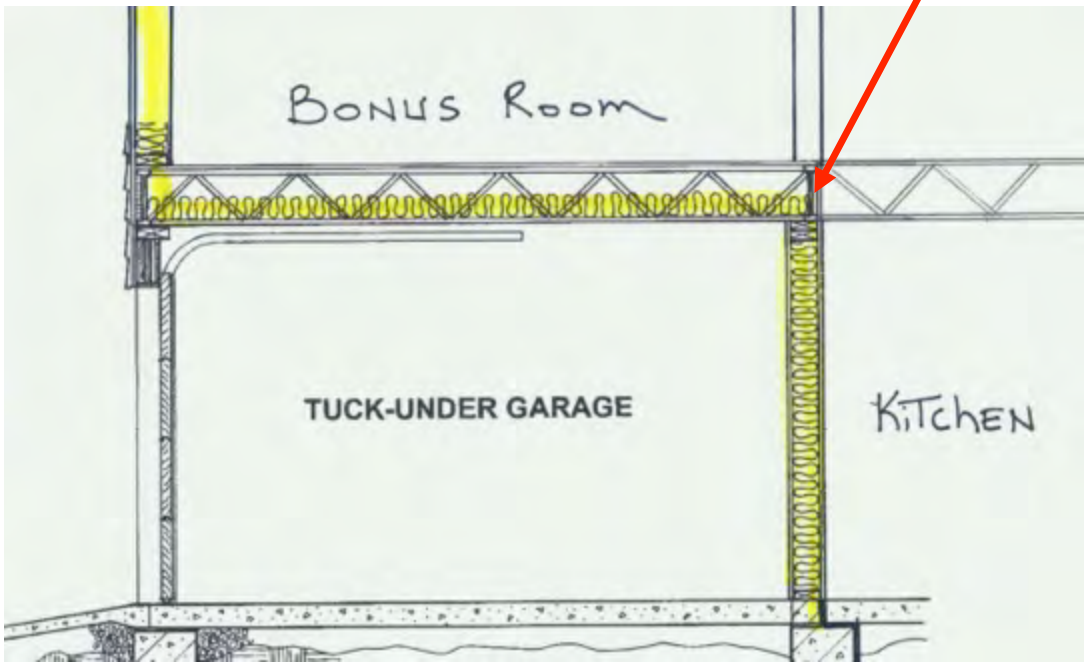
Shallow Truss/I-joist depth?

(insulation below floor system)



Question – Continuous Air Barrier

Should the enclosed floor be sealed off to permit air movement from other floor spaces?



Corrected Building Science

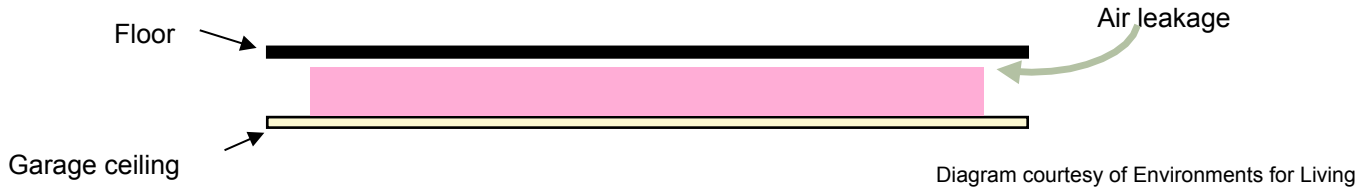


Figure 3.1 - Air leakage at garage ceiling

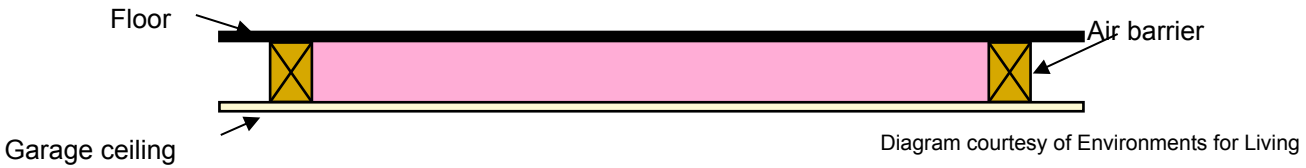


Figure 3.2 - Alignment of insulation and air barrier at garage ceiling

Figure 3.3 - Alignment of insulation and air barrier at garage ceiling with spray foam or faced batt insulation

What You Need for a CO (Certificate of Occupancy)

Energy Efficiency Certificate

Address: 1234 Sandpiper Road Eagan, MN 55121
Builder: Great Homes, LLC
Date Installed: 08/09/2014
Contractor License: JK934234342

R-Values

Attic R-Value	49	Wall R-Value	21
Rim/Band Joists	21	Foundation Wall R-Value	10
Crawlspace Wall R-Value	N/A	Concrete Slab R-Value	10
Ductwork R-Value	8	Crawlspace Slab R-Value	N/A

Windows

	U Factor	SHGC		U Factor	SHGC
Front	0.32	0.29	Back	0.32	0.29
Left	0.32	0.29	Right	0.32	0.29

Heating System

Type	Furnace
Model #	xxxx
Efficiency	95
Manufacturer	xxxxx
Input Rating	85,000

Water Heater

Type	Storage
Model #	xxxx
Efficiency	0.67
Manufacturer	xxxx
Input Rating	40,000

Air Conditioner

Type	Central
Model #	xxxx
Efficiency	13
Manufacturer	xxxx
Input Rating	36,000

Ventilation

Type	Balanced
Location	Basement
Exhaust Air	130 CFM
Intake Air	125 CFM

Make Up Air

Type	N/A
Location	N/A
Size	N/A

Radon Mitigation

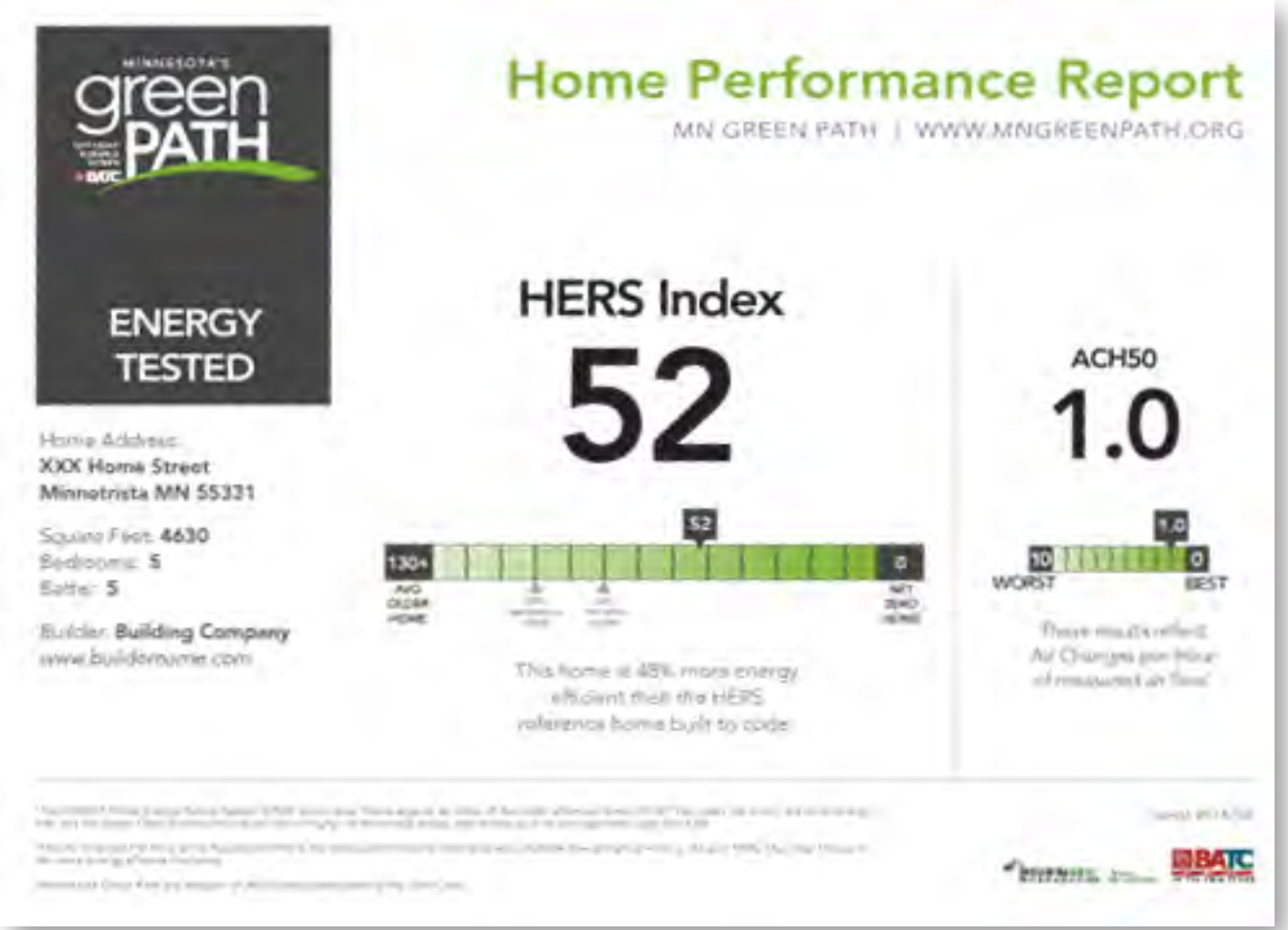
System Type	Active
Location	Attic

Designed Continuous Ventilation	xxxx
Designed Total Ventilation	xxxx

Calculated Heat Loss	75,000 BTU/h	Blower Door	800 CFM
Calculated Heat Gain	14,000 BTU/h	Air Changes at 50 Pa	2.56 ACH50
Calculated Cooling Load	30,000 BTU/h	Total Duct Leakage	28 CFM

residential science resources

How Will You Differentiate Your Home Now??



residential science resources

HOUSE RATER

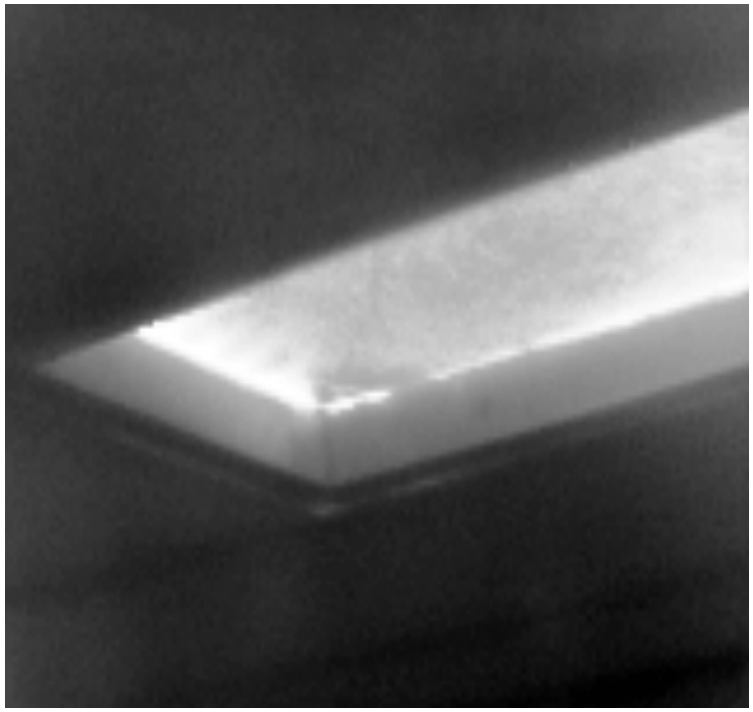
Some Performance Tools

Photos courtesy of The Energy Conservatory

residential science resources

HOUSE RATER

Leaking Attic Hatch



Summer

Winter

Residential Science Resources

HOUSE RATER

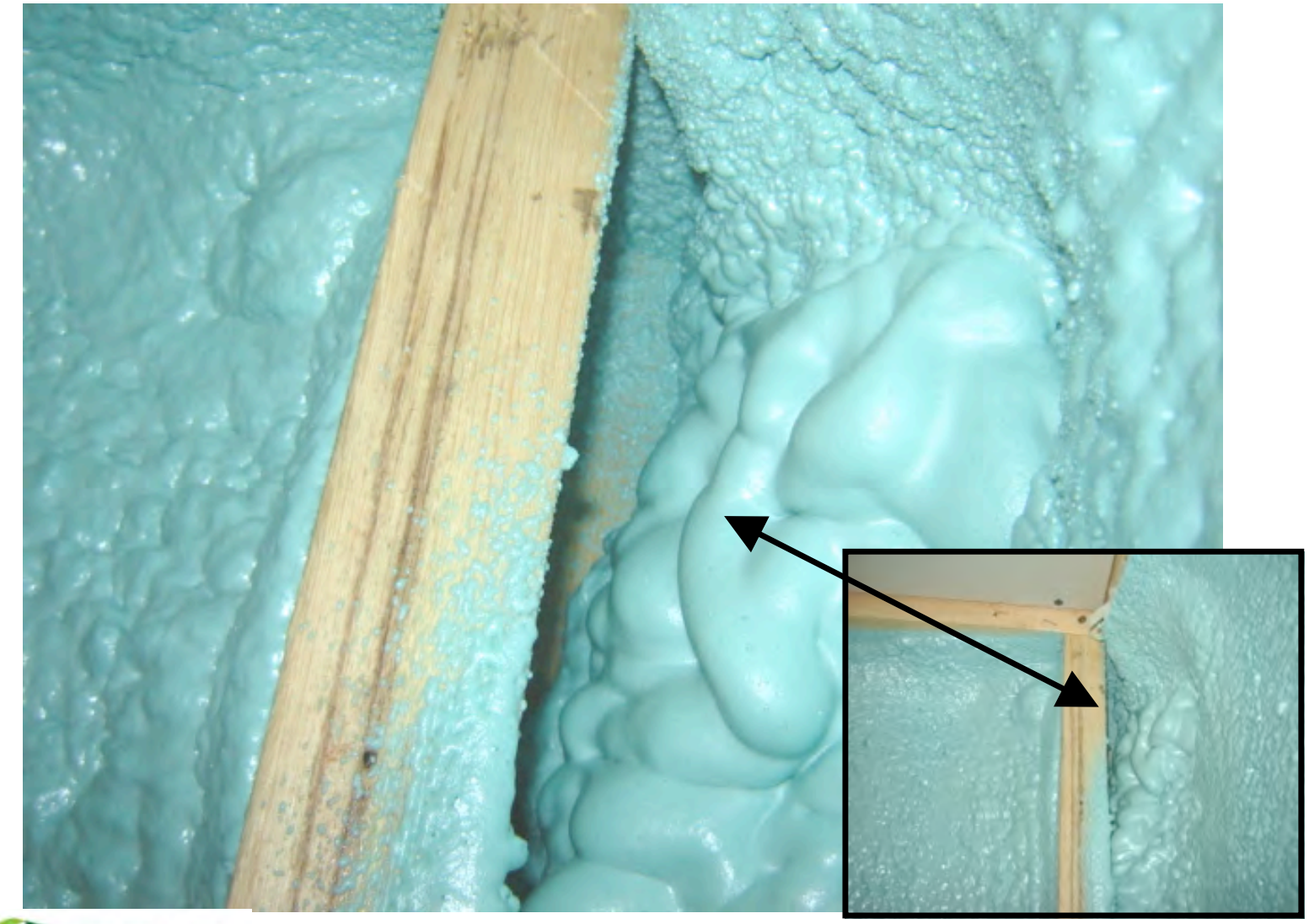
Best Practice: Cantilevers?

residential science resources

HOUSE RATER

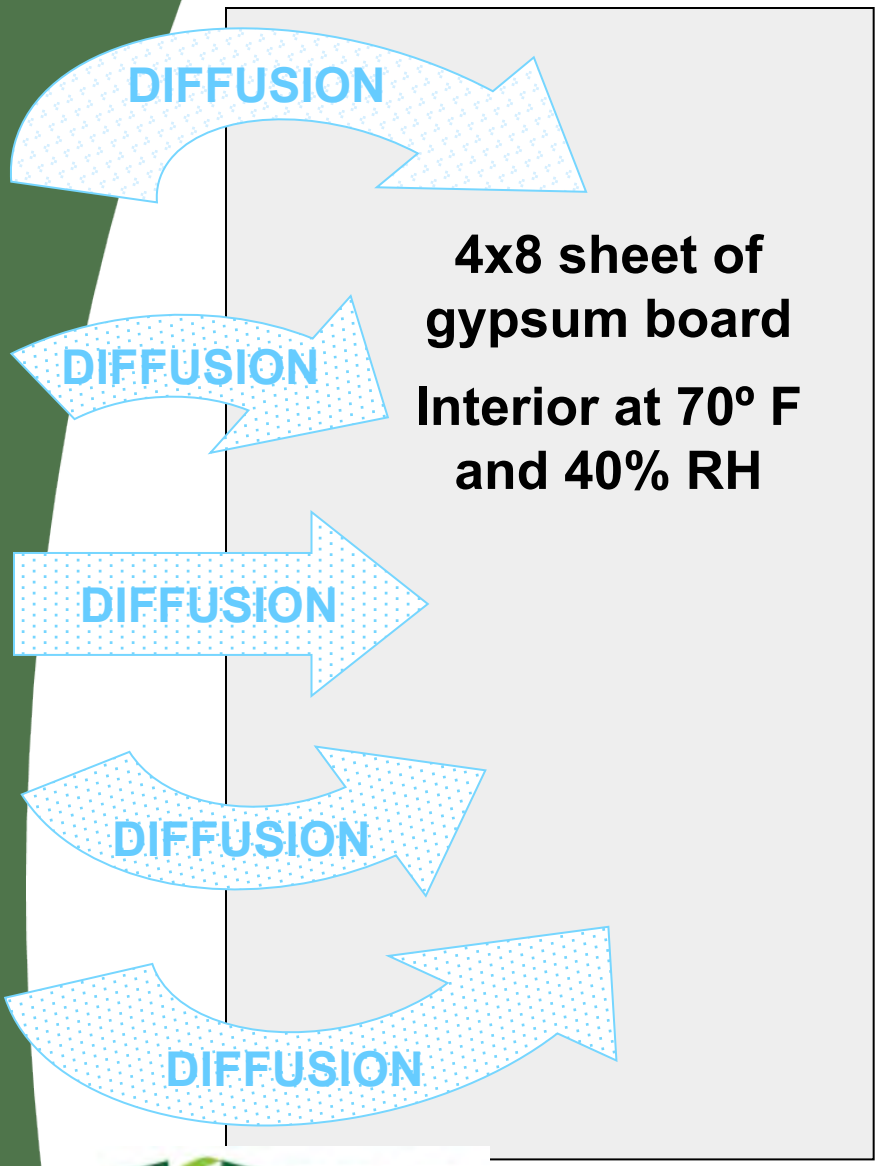
Closed cell Spray Foam

Is spray foam fool-proof??

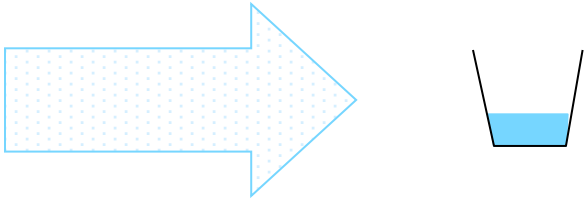


residential Science resources

Diffusion



Test Period was One Cold Climate Heating Season



1/3 quart of water

Air Transported Moisture

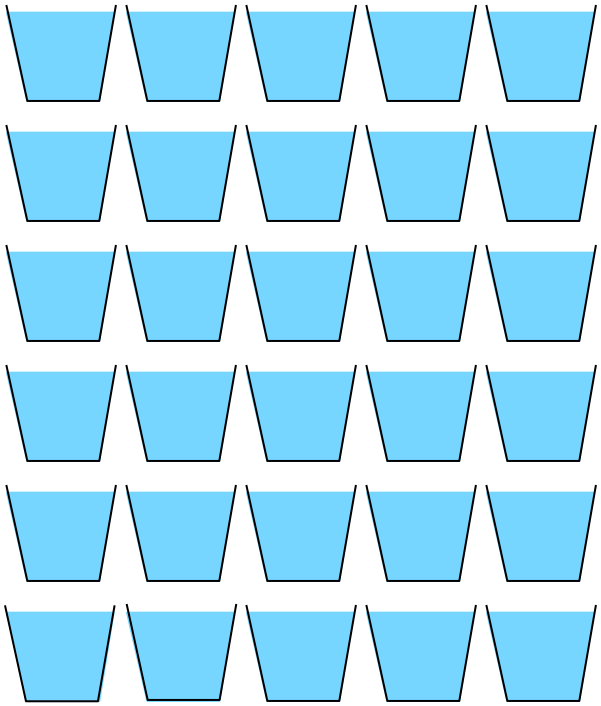
4x8 sheet of gypsum board with 1 in^2 hole

Interior at 70º F And 40% RH

Air Leakage

Test Period was One Cold Climate Heating Season

30 quarts of water



residential science resources

MLS Designation

Northstar MLS
For your Information. For your Success.

MINNESOTA'S green PATH
EFFICIENT DURABLE HOMES

52	HERS INDEX
✖	Green Homes Certified

MN Green Path Advanced & Master Certified, NAHB Green, Green Communities, LEED for Homes, Wisconsin Green Build, and MN GreenStar

residential science resources

HOUSE RATER

Why Residential Science?

Framing

Framing Site Walk Report

RSR File Number: 08-XE-123-01 Site Walk Date: May 1, 2008

Home: Jane and John Doe
4520 Summerfield Avenue S, Hometown, MN 55555
Development: Happy Meadows
Model: Cordova
Builder: Gateway Builders
543 Railroad Avenue, Woodbury, MN 55555

Potential Concerns:

1 Blocking missing
2 Drainage plane
3 Framing/decking
4 Insulation
5 Vapor barrier
6
7
8
9

Floor system blocking missing
Air from unconditioned spaces can move into floor assemblies if rim joint locations are inadequately sealed. This degrades insulation performance, can lead to uneven floor temperatures and decreased occupant comfort and safety. Install and seal solid blocking at rim joist locations to isolate insulated floors from un-insulated floors, garages and attic spaces.

Apron flashing reversed
Apron flashing installed over house wrap can direct water into the building. Install house wrap shingle fashion over apron flashing to drain water down and out.

Insulation

Loose-fill insulation missing
Missing exterior wall insulation in chases can lead to uneven interior surface temperatures and uncontrolled air leakage into the structure. Apply rigid insulation over fully insulated wall cavities and air barrier.

Soffit/dropped ceiling
Soffits or dropped ceilings without solid sheathing allow an open connection between wall and attic/floor cavities. This can result in uneven interior surface temperatures and air leakage into living space. Apply solid sheathing against wall and ceiling as a draftstop before framing soffits or dropped ceilings.

Voids/gaps/compressions in fiberglass
Insulation performance can be reduced by misalignment, voids, gaps and compressions and may lead to building durability issues, uneven interior surface temperatures, occupant discomfort, and high utility costs. Completely fill cavities without voids, gaps, or compressions and with the insulation in full contact with the air barrier.

Voids/gaps/compressions in fiberglass
Insulation performance can be reduced by misalignment, voids, gaps and compressions and may lead to building durability issues, uneven interior surface temperatures, occupant discomfort, and high utility costs. Completely fill cavities without voids, gaps, or compressions and with the insulation in full contact with the air barrier.

Final Testing

Final Testing and Completion Report

RSR File Number: 08-XE-123-01 Site Walk Date: July 5, 2008

Home: Jane and John Doe
4520 Summerfield Avenue S, Hometown, MN 55555
Development: Happy Meadows
Model: Cordova
Builder: Gateway Builders
543 Railroad Avenue, Woodbury, MN 55555

Energy Star Rating
This Home meets the Energy Star Requirements
HERS Index
Thermal Bypass Checklist (TBC)
Duct Leakage
Air Sealing
Pass
Meets
Verified

Tax Credit Status
This home is 62 % more efficient than the 2004 IECC
Homes over 30% may be eligible for 2005 EPACT

HERS Index
RESNET Ratings provides a relative energy use index called the HERS Index. a HERS Index of 100 represents the energy use of the "American Standard Building" and an Index of 0 (zero) indicates that the Proposed Building uses no net purchased energy (a Zero Energy Building). The HERS Index is a linear metric which every percentage point that a building's energy use is reduced represents a decreased point reduction on the Index.

Your home earned a 63

Home Performance Testing Results
Blower Door Results
Duct Leakage Results
Ventilation Flow Results

Mechanical Equipment

Type of Equipment	Efficiency	Brand/Make	Model
Primary Heating System	0.92	Lennox	SLP98UH090V48B
Primary Cooling System	SEER 13	Lennox	13ACX060230-3
Mechanical Ventilation		Panasonic	FV-08-VE2
Thermostat		Honeywell	VisionPro
Domestic Hot Water	0.62	Bradford White	M150T6N6DEN

residential science resources

HOUSE RATER